

Date: Wednesday, 07/01/2009 10:28:50 AM
 User: Julie Dawson

Process Sheet

Customer : CU-DAR001 Dart Helicopters Services Drawing Name : 350/355 AS X-TUBE FWD
 Job Number : 44431
 Estimate Number : 12485
 P.O. Number :
 This Issue : 07/01/2009 S.O. No. :
 Prsht Rev. : NC
 First Issue : / / Type : CROSSTUBES
 Previous Run : 44430
 Part Number : D350748101
 Drawing Number : N/A
 Project Number : N/A
 Drawing Revision : D
 Material :
 Due Date : 30/01/2009 Qty: 1 Um: Each
 Written By :
 Checked & Approved By : JLD 09.01.07
 Comment : Est Rev:A New Issue 06-07-05 JLM
 Est Rev:B Update qty of MS21042L5 06-09-12 KJ
 Est Rev:C Rev B 07-11-15 DD
 Est Rev D Combined manufacturing 08.04.02 EC verified by:
 DD
 Est Rev:E 08-06-24 revD as per dwg DD verified by:EC

Additional Product

Job Number:



Seq. #: Machine Or Operation: Description :

1.0 DC DOCUMENT CONTROL



HJ for JLD 09/02/24



Comment: Photocopy bluefile & type labels per PPPD350-748-101 CHG001

502/06/04

2.0 D350748141TRN Crosstube Turning Detail



Comment: Qty.: 1.0000 Each(s)/Unit Total: 1.0000 Each(s)
 CROSSTUBE TURNING DETAIL
 batch B42396

DP

9-1-19

3.0 BENDING BENDING MACHINE - SKIDTUBES



(PK)

Comment: BENDING MACHINE
 Bend tube as per Dwg D350-748-141 using CNC bender program D350F and Folio FT

DP 9-1-19

4.0 QC15 DIMENSIONAL CHECK OF X-TUBES



Comment: DIMENSIONAL CHECK OF X-TUBES

P 09.01.20

5.0 CROSSTUBES CROSSTUBES RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Drill Tube as per Dwg D350-748-141 Using DT8876 A,B & C Drill Jigs,
 Set-up drill table as per QSI 010

DP/mb

09-01-22

2-Debur

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D350-748-101 PAR #: _____ Fault Category: _____ NCR: Yes ☒ No ☐ DQA: DD Date: 09/02/25
 Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR: <u>44431</u>		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
09.01.19	3	Tube bent high. Angles below tolerance. SEE DIM SHEET	CP 09.01.20 pc QSI042	Cut @ 23.375" high. OK.	MB 09-01-20	S 09/01/22	CP 09.01.30 pc QSI042	S 09/01/22

NOTE: Date & initial all entries

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Drawing Name: 350/355 AS X-TUBE FWD

Job Number: 44431

Part Number: D350748101

Job Number:



Seq. #:

Machine Or Operation:

Description :

3-Engrave Part # and Batch # as per Dwg D350-748-141

> ~~MS~~ / MS 09-21-21

4-Remove all marks from tube within limits of D350-748-141

> MS 09-01-22

5- Apply a light coat of LPS3 on the interior of tube

Batch: M109539

MS 09-01-22

6.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

CHECK 10 DEG HOLES WITH DT8876E(EUROCOPTER CLAMP)

S09/01/22 (1)

7.0

OUTSIDE SERV.11

OUTSIDE SERVICE -CROSSTUBES



Comment: Sub-Contracting OUTSIDE SERVICES

Issue P/O: 8035

Stress relief at 375° for 5 hours

Magnetic Particle Inspect per ASTM E1444

Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2

Embrittle relief at 375° for 8 hours, Chromate Treat

Possible Supplier: Southwest United Industries

Ensure Certificate of Conformity is attached

C209/01/23

(1)

8.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Receive & Inspect For Transit Damage

Ensure certificate of conformity is attached

12/2/12 (1)

9.0

QC5

INSPECT WORK TO CURRENT STEP



MS 09 02 18 (1)



Comment: INSPECT WORK TO CURRENT STEP

10.0

SPRAY PAINTING

SPRAY PAINTING



Comment: SPRAY PAINTING

1-Prime inside crosstube as per QSI 005 4.2

2-Prime Outside of Tube as per Dart QSI 005 4.2

RT 09-02-19

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Job Number: 44431

Part Number: D350748101

Job Number:



Seq. #:

Machine Or Operation:

Description :

11.0

QC14

INSPECT SPRAY PAINT



Comment: Inspect Spray Paint

Then, Wrap in plastic bag to protect from scratches

ml 09 02 19 (1)

12.0

D35021

Support



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

SUPPORT

Batch: 42968

RT 09-02-20

13.0

D2856400

Abrasion Strip



Comment: Qty.: 1.2401 f(s)/Unit Total : 1.2401 f(s)

Abrasion Strip 7.10" long x2

Batch: 37667

RT 09-02-20

14.0

ALS41032225

Insert



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Insert

Batch: 19393

RT 09-02-20

15.0

AN960JD10

Washer



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Washer

Batch: 109632

RT 09-02-20

16.0

MS2192020

Clamp (per MIL-DTL-8783C)



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Clamp (per MIL-DTL-8783C)

Batch: 109269

RT 09-02-20

17.0

MS27039110

Screw



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Screw

Batch: 109031

RT 09 02-20

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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Job Number: 44431

Part Number: D350748101

Job Number:



Seq. #:

Machine Or Operation:

Description :

18.0

CROSSTUBES

CROSSTUBES RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Install Ground wire Insert, then insert screw and washer

2-Install Abrasion strips as per Dwg D350-748-141 & QSI 035.

3-Install supports Using Dt8876 as per Dwg D350-748-141, Torque to 60-80 IN-LBS

RT
09-02-20

19.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

09-02-23 (1)

0.230" twist
acceptable

20.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Pick Packing Kit

21.0

D35001

Saddle



Comment: Qty.: 4.0000 Each(s)/Unit Total: 4.0000 Each(s)

350 SADDLE

Batch: 1343396

SP

22.0

D35011

Bushing



Comment: Qty.: 16.0000 Each(s)/Unit Total: 16.0000 Each(s)

BUSHING

Batch: 1343397

SP

23.0

AN46A

Bolt



Comment: Qty.: 16.0000 Each(s)/Unit Total: 16.0000 Each(s)

Bolt

Batch: 1109545

SP

24.0

AN441A

bolt



Comment: Qty.: 8.0000 Each(s)/Unit Total: 8.0000 Each(s)

bolt

Batch: 1109632

9/12/23

(A)

SP

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Job Number: 44431

Part Number: D350748101

Job Number:



Seq. #:

Machine Or Operation:

Description :

25.0

AN532A

Bolt



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Bolt

Batch: M110363

SP

26.0

AN960JD416

Washer



Comment: Qty.: 32.0000 Each(s)/Unit Total : 32.0000 Each(s)

Washer

Batch: M110523

SP

27.0

AN960JD516

Washer



Comment: Qty.: 8.0000 Each(s)/Unit Total : 8.0000 Each(s)

Washer

Batch: M110363

SP

28.0

MS21042L4

Nut



Comment: Qty.: 24.0000 Each(s)/Unit Total : 24.0000 Each(s)

Nut

Batch: M109282

SP

29.0

MS21042L5

Nut



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Nut

Batch: M110382

9/12/23

(14)

SP

30.0

QC4

INSPECT 100% KITS FOR COMPLETENESS



Comment: INSPECT 100% KITS FOR COMPLETENESS

809102/24

31.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and pack for shipping as per PPP D350-748-101

Location: B

PPP Rev: B

9/12/24

(K)

SP

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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Job Number: 44431

Part Number: D350748101

Job Number:



Seq. #:

Machine Or Operation:

Description :

32.0

QC21

FINAL INSPECTION/W/O RELEASE



09/02/24 J

Comment: FINAL INSPECTION/W/O RELEASE

Job Completion



MF 09-02-24

44431

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

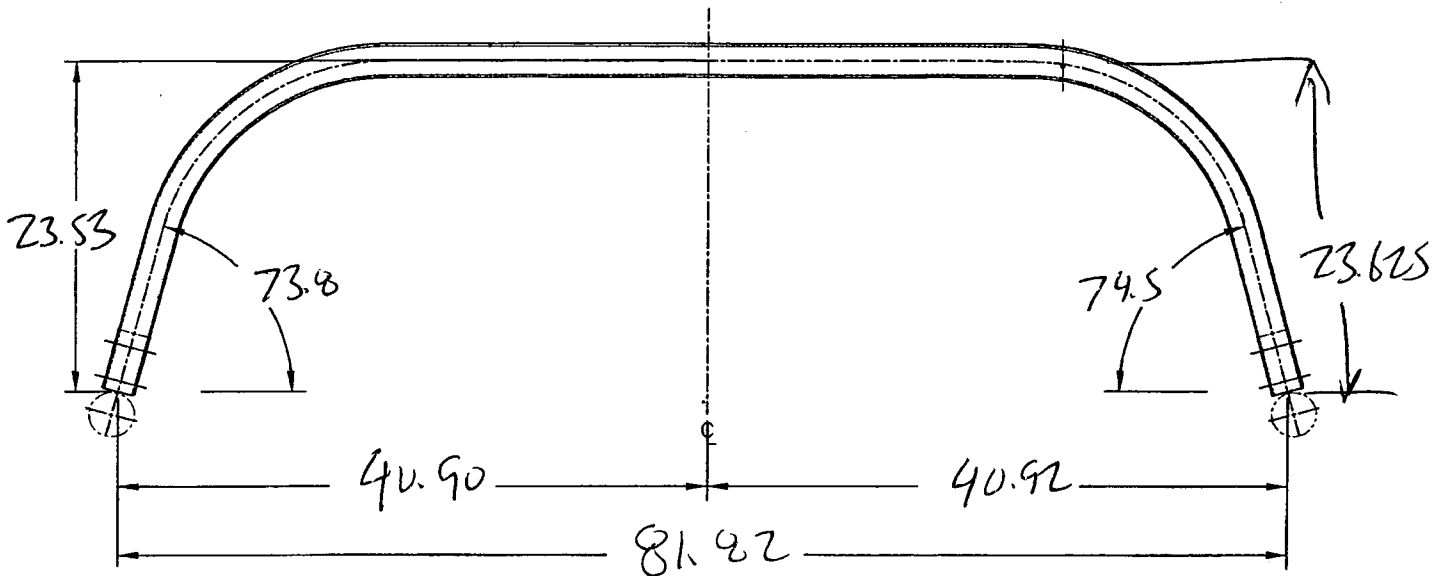
Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD		Work Order:	44431
Description: Crosstube High Fwd (AS350/355)		Part Number:	D350-748-101
Inspection Dwg: D350-748-141 Rev: D		Page 1 of 1	

Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04



Comments
Tube bent high. Angles below tolerance
Cut @ 23.375" HIGH

QC15 Inspection	CP
Date	07.01.20

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	[Signature]



DESIGN <i>qp</i>	DRAWN BY <i>qp</i>	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>[Signature]</i>	APPROVED <i>[Signature]</i>	DRAWING NO. D350-748-141	REV. D SHEET 1 OF 3
DATE 06.10.31		TITLE CROSSTUBE (AS 350/355 HI FWD)	SCALE NTS
A	06.03.31	NEW ISSUE	
B	06.06.30	ADD D6017-115 & PRIME AND PAINT	
C	06.08.14	ADD CAD PLATING	
D	06.10.31	MAG. PARTICLE AND CAD PLATE AS MFD.	

RELEASED

06.10.31 *[Signature]*

QTY	P/N	DESCRIPTION
X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
1	D6017-115	CROSSTUBE (OR D6015-125)
2	D3502-1	SUPPORT
2	D2856-400-710	ABRASION STRIP
1	AELS-1032-225	INSERT
1	AN960JD10	WASHER
2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
1	MS27039-1-10	SCREW

D350-748-141 CROSSTUBE:

- 1) MATERIAL: MANUFACTURED FROM D6017-115 OR D6015-125
FINISHED LENGTH = 110.27 ± 0.06
- 2) MACHINE PER MACHINING DETAIL ON PAGE 3. BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITIONS SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 3) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 4) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 5) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING
- 6) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 7) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- 8) INSTALL D2856-400-710 ABRASION STRIP WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 9) TORQUE MS21920-20 CLAMPS 60 TO 80 IN-LB
- 10) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 11) ALL DIMENSIONS ARE IN INCHES
- 12) PART IS SYMMETRIC ABOUT CENTERLINE EXCEPT FOR $\varnothing 0.297$ HOLE.

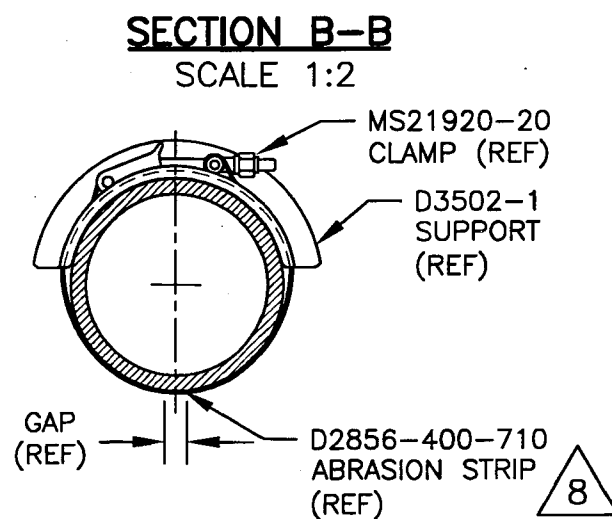
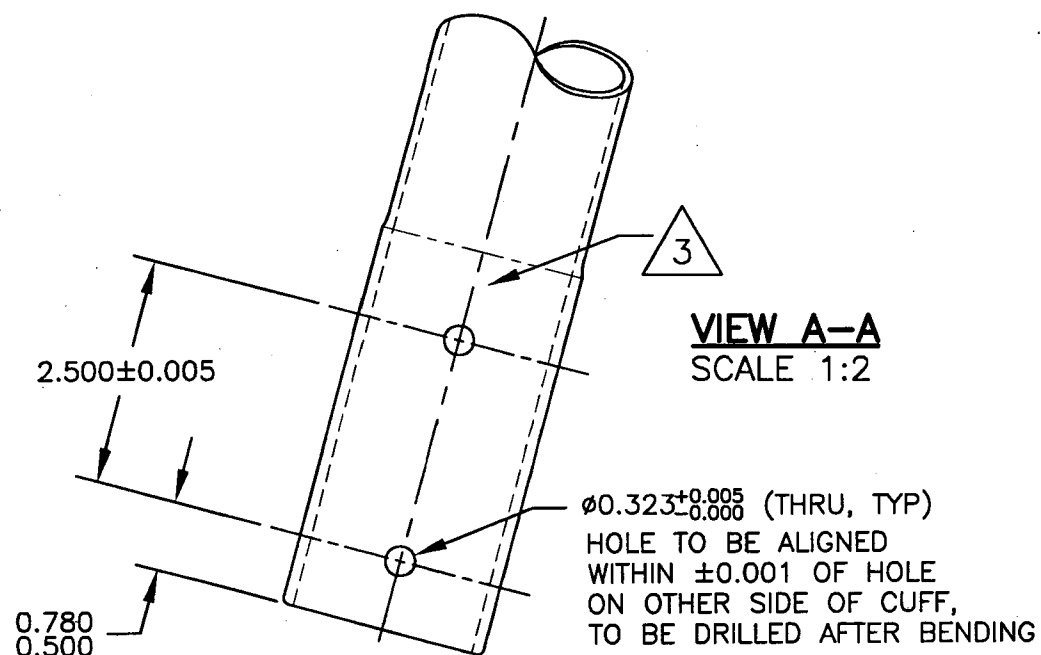
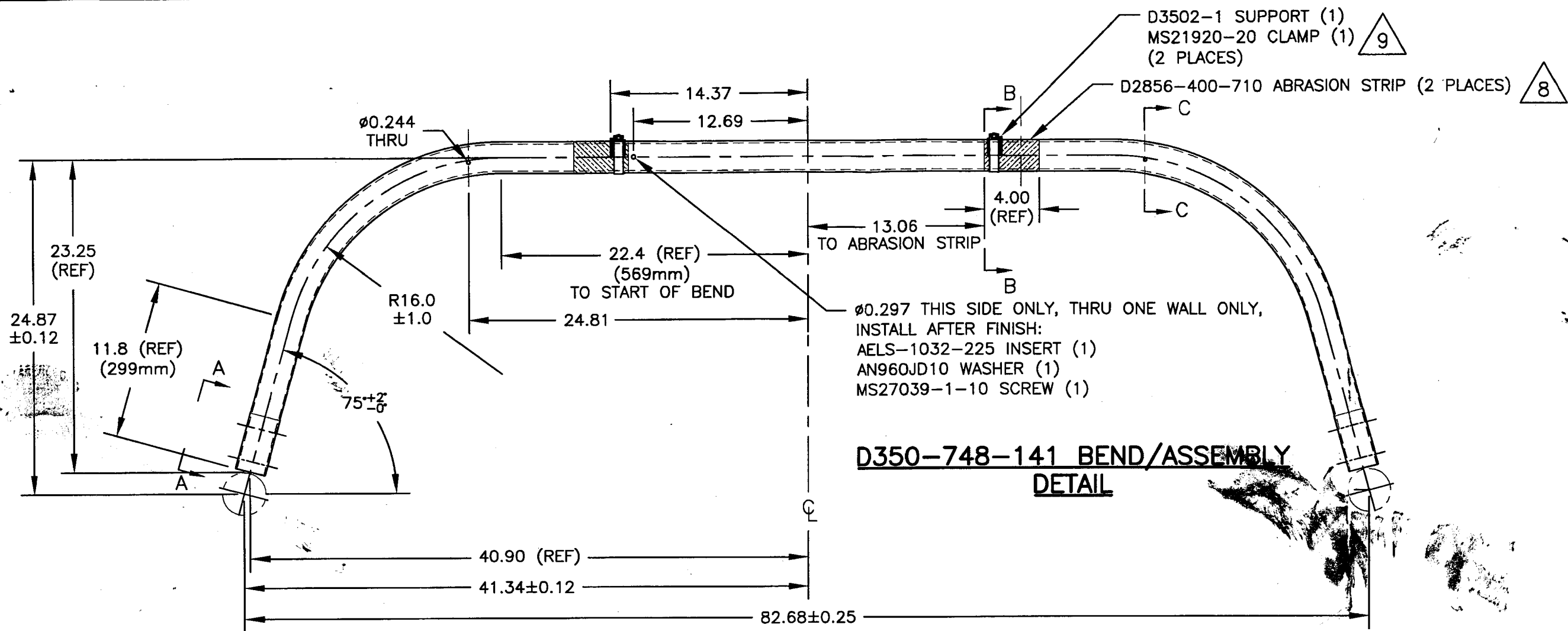
CONTROLLED COPY
ENGINEERING
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 14431

UNDER REVIEW!

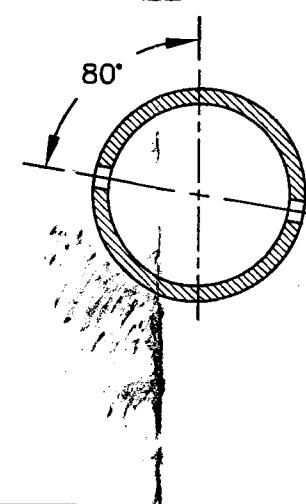
07.02/16 *[Signature]*
CUFF *[Signature]*
OK 07.02.22

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SECTION C-C
SCALE 1:2



SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 44431

UNDER REVIEW

07.02.16

CUFF BEING REWORKED

07.07.22

RELEASED

06.10.31

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DART AEROSPACE LTD.

DESIGN qp	DRAWN BY qp	DART	DART AEROSPACE LTD. HAWKESBURY, ONTARIO, CANADA
CHECKED H	APPROVED H	DRAWING NO. D350-748-141	REV. D SHEET 2 OF 3
DATE 06.10.31		TITLE CROSSTUBE (AS 350/355 HI FWD)	SCALE 1:8

**CERTIFICATE OF
CONFORMANCE**

**CADORATH PLATING CO. LTD.
2150 LOGAN AVENUE
WINNIPEG, MANITOBA R2J-0J1**

DATE: Feb-13-2009

CONSIGNED TO: Dart Aerospace Ltd.
1270 Aberdeen St.
Hawksbury, ON K6A 1K7

W/O #: 83656
INVOICE #: 43109

**CONTRACT OR
PURCHASE ORDER #** PO00008035

DESCRIPTION: SKID

QTY 1

P/N # d350-748-101

S/N # B44431

**STRESS RELIEF BAKE @ 375 DEG FOR 5 HRS HEAT BAKE CHART
#10093. MPI INSPECTED IAW ASTM-E-1444. CADMIUM PLATE IAW
AMS-QQ-P-416B, TYPE 2 YELLOW, CLASS 2. BAKE HAET CHART
#10135.**

P/O 8035

ml 09/02/18

**CERTIFICATE: I certify that the items indicated here on have
been inspected and tested and conform to all specifications
and requirements detailed on the contract or purchase order.**

Approved Inspector:

